

Dionda mandibularis, a new cyprinid fish endemic to the Upper Río Verde, San Luis Potosí, México, with comments on related species

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ABSTRACT.—*Dionda mandibularis*, n. sp., is described from localities in the Upper Río Verde, State of San Luis Potosí, México, on the basis of its double S-shaped intestine, longer than the standard length; pharyngeal teeth 4–4; 37–44 lateral-line scales, and 18–23 predorsal scales; 8 or 9 dorsal and usually 8 (7–10) anal rays. Particularly diagnostic is the shape of the mandible, with its lower surface flat and strongly angular in respect to its rami; the lower lip surpasses the upper by a distance nearly equal to its own thickness. This species adds a new element of Nearctic affinities to the interesting endemic fauna of the Río Verde, and to the Panuco-Tamesí system.

RESUMEN.—*Dionda mandibularis*, n. sp., se describe como nueva de localidades del Alto Río Verde, Estado de San Luis Potosí, México, sobre la base de presentar un intestino en doble S, mayor que la longitud patrón; dientes faríngeos 4–4; 37–44 escamas en la línea lateral y 18–23 predorsales; 8 a 9 radios dorsales y generalmente 8 (7–10) anales; particularmente diagnóstica es la configuración de la mandíbula, cuya superficie inferior es plana, y fuertemente angulosa respecto a las rami mandibulares; el labio inferior sobresale del labio superior por una distancia aproximadamente igual a su propio grosor. Esta especie agrega un nuevo elemento endémico de afinidades néarticas, que se agrega a la peculiar fauna de peces de la región del Río Verde Alto, y al sistema Pánuco-Tamesí.

The region of La Media Luna, 7 km south of the town of Ríoverde, in the State of San Luis Potosí, México, was explored by the authors and a group of students of the Universidad Autónoma de Nuevo León, in July, 1968. They obtained samples of the interesting endemic fishes of the basin, which is part of the Río Pánuco drainage. Study of these specimens revealed some novelties of Nearctic affinities, one of which, the subject of the present paper, represents a new species referred to the cyprinid genus *Dionda*.

Dionda mandibularis, n. sp.

Material.—**HOLOTYPE:** Universidad Nacional Autónoma de México (Instituto de Biología) Fish Collection No. P 436; male; 43.7 mm in standard length; from a creek 7 km SSE of town of Ríoverde, San Luis Potosí, México; 14 July 1968; Salvador Contreras *et al.* coll. **PARATYPES:** Universidad Autónoma de Nuevo León Fish Collection No. 1032 (13; 30.8–47.5 mm); same data as holotype (2 now at Instituto Politécnico Nacional No. P 3679; 2 at Tulane University No. 94115). UANL 1320 (11; 32.0–48.2); same locality; 15 July 1968, same coll. University of Michigan Museum of Zoology 193474 (11; 31.9–52.1 mm); from a spring-fed marsh on east side of road to Pedro Montoya, 9.7 km S of Ríoverde; 9 December 1972; R. R. and F. H. Miller and N. A. Neff coll. **NON-TYPE MATERIAL:** UMMZ 196339 (33; 42–58 mm); Puerto del Río, near Cerritos, San Luis Potosí; 5 February 1974; R. R., G. H., and F. H. Miller coll. UMMZ 196703 (6; 38–49 mm); same locality as UMMZ 193474; 21 March 1974, R. R. and F. H. Miller coll.

Diagnosis.—A species of *Dionda* with a double-S intestine longer than the standard length. The lower jaw is prognathous, with a flat mental-gular area that is strongly and abruptly angular to the lower margin of the head farther back, yielding a characteristic profile. Lateral-line scales 37–44; predorsal scales 18–23; dorsal rays 8–9, anal rays 8 (extremes 7–10).

Description.—The general physiognomy of the new species is that of an emaciated fish, like the “consumption” familiar to aquarists. However, after much consideration, we have concluded that it is the normal appearance of the species, and a distinctive trait (Fig. 1).

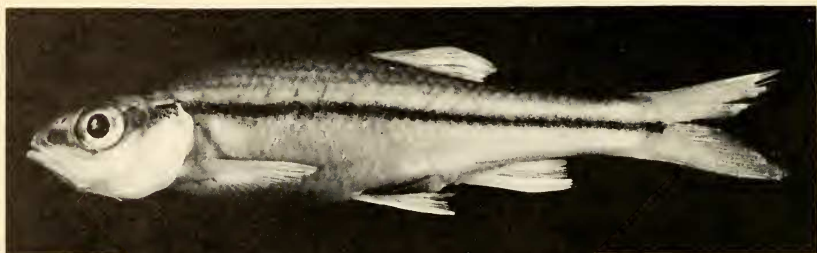


Figure 1. *Dionda mandibularis*, n. sp.: holotype, a male 43.7 mm SL, Universidad Nacional Autónoma de México (Instituto de Biología) Fish Collection No. P 436, collected in a creek 7 km SSE of Ríoverde, San Luis Potosí, México, on 14 July, 1968, by Salvador Contreras *et al.*

The body is moderately robust and slightly compressed. The caudal peduncle is slender. The dorsal profile is markedly convex, whereas the ventral profile is rather flattened. The conical head is subequal in width and height. The snout is convex. The mouth is terminal; the upper lip overhangs the lower by a distance about equal to its transverse width. The lower jaw is flat on the chin-gular surface, a condition easily observed in lateral view. The mandibular rami form a strong angle with the subhorizontal lower margin of the median portion of the head. The lateral line is complete on the anterior half of the body; it is slightly decurved, but on the posterior half it is almost straight, along the lateral band. The dorsal fin originates nearer the caudal base than the snout, over or slightly behind the insertion of the pelvics. The anal fin originates slightly behind the vertical from the end of the dorsal-fin base. In comparison with other species of the genus, all fins are relatively short.

The gut forms a double-S (Fig. 2 C), that derives from an entire twist of the original single loop typical of *Notropis*, in a counterclockwise direction. Peritoneum is black. The slightly oval scales have few apical radii; their exposed fields are usually 1.5 times higher than long, except on the anterolateral parts of the body, where they may be only slightly higher.

The head length measures 3.2–3.7 and the body depth 3.5–4.8 in the standard length. The caudal-peduncle length is 2.0–2.3 times its depth. The depressed dorsal-fin length measures 2.3–2.7 in the predorsal length. The depressed anal-fin length equals the pectoral-fin height. The eye diameter is somewhat less than either the snout length or the interorbital width (which are almost equal, and slightly less than the caudal-peduncle depth). The pectoral-fin tip fails to reach the pelvic-fin origin by a distance slightly less than the eye diameter in males, but longer than the eye in females. The pelvic fin in males reaches the anal origin and in females does not extend back of the anus. The anterior rays are notably longer than the posterior ones in the depressed dorsal fin, but scarcely so in the depressed anal.

Morphometrics and Meristics.—Measurements (Table 1) and counts (Table 2) were taken according to the methods standardized by Hubbs and Lagler (1958, 1964), on the holotype (values underlined in Table 2) and on 30 paratypes.

Nuptial Tubercles.—The tubercles of adult males are small and numerous, although the available material may not present their highest development. These tubercles are distributed in a V-shaped band over the top of the head, with the vertex anteriad, and the rami above the eyes. The band may be continuous over the snout, and between the nostril and the lip, with the lateral bands that occur below the eyes, from the nasal area to the interopercle, with some tubercles on the extreme lower part of the opercle and subopercle. On the body are some

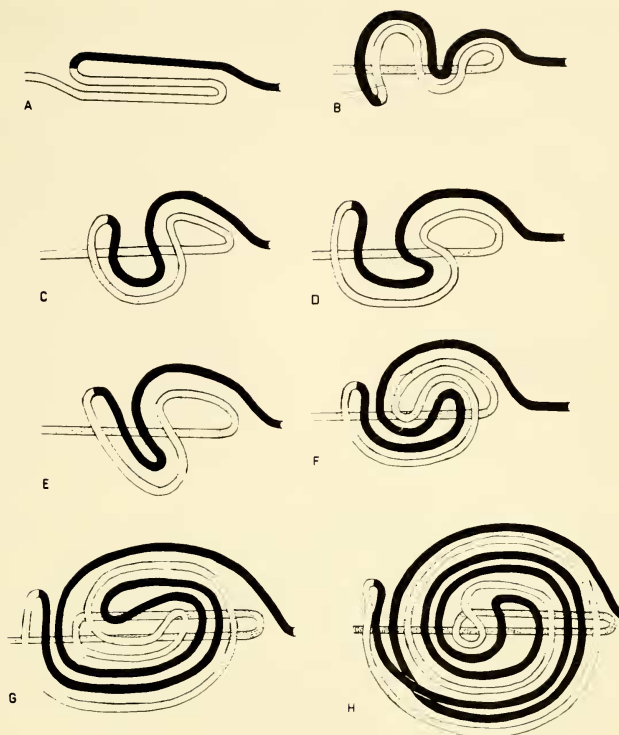


Figure 2. Intestines of several cyprinid fishes: (A) *Notropis* spp., standard type; (B) *Notropis mekistocholas*, modified from Snelson, 1971; (C) *Dionda mandibularis* n. sp., paratype, 35.5 mm SL; (D) *Dionda* sp., 40.7 mm SL, from near Ríoverde, San Luis Potosí; (E) *Dionda erimyzonops*, 28.9 mm SL, from the Río Tamesí, Tamaulipas; (F) *Dionda ipni*, 26.8 mm SL, from Río Pánuco, San Luis Potosí; (G) *Dionda diaboli*, 38.8 mm SL, from Río Salado, Coahuila; (H) *Dionda episcopa*, 30.7 mm SL, from Río San Juan, Nuevo León. All from México. The circulation of the gut contents is from left to right.

tubercles, smaller on the anterodorsal region, and little developed on the lower sides of the caudal peduncle.

Sexual Dimorphism.—As is common in cyprinids, the fins of *Dionda mandibularis* are usually longer in males than in females; the pelvics commonly reach the anal origin and the anus, respectively.

Coloration.—In life, the body is cream-colored, with a black lateral band that becomes wider and more diffuse toward the head. It is much the more strongly marked posteriorly, and terminally forms a basicaudal spot, which is slightly or not at all separated from the band, and does not invade the caudal fin. The dorsal half of the body is marked by two other longitudinal areas: the uppermost is dark green, with the centers of each exposed field on the scales lighter; the lower and lighter area intervenes between the dorsal and lateral bands, and is transgressed by small dark streaks that extend posterodorsad from the lateral band. The venter is light cream, with the black peritoneum noticeable. The head is dark green above, and is silvery below a line that extends from the middle of the upper lip, along the lower part of the orbit, and to the insertion of the opercle; it joins

TABLE 1. Morphometry of *Dionda mandibularis*, from the Upper Rio Verde, San Luis Potosí, México, in thousandths of the standard length.

	Holotype	Paratypes			
	UNAM P 436	UANL 1032 & 1320 (19)		UMMZ 193474 (8)	
Standard length (mm)	43.7	30.8	48.2	31.9	52.1
Predorsal length	568	532 (560.2)	576	551 (562.3)	570
Prepelvic length	529	511 (521.0)	540	515 (525.6)	539
Body depth	266	239 (260.3)	292	227 (253.9)	286
Head length	273	279 (291.3)	310	288 (293.8)	301
Snout length	88	87 (96.8)	114	83 (91.6)	100
Eye diameter	81	79 (87.2)	93	84 (92.4)	99
Interorbital width	92	88 (99.0)	112	89 (92.9)	100
Postorbital length of head	113	114 (120.5)	127	114 (122.4)	132
Caudal-peduncle length	219	198 (216.9)	231	208 (221.8)	233
Caudal-peduncle depth	99	99 (106.8)	116	87 (101.9)	112
Depressed dorsal fin	231	203 (233.4)	259	205 (232.6)	246
Depressed anal fin	194	184 (201.6)	219	182 (201.4)	224
Pectoral fin length	203	185 (201.3)	217	177 (204.4)	223
Pelvic fin length	173	166 (177.0)	197	163 (176.3)	195

the light venter. The basal two-thirds of the fins are yellowish; the dorsal is darkish on its distal third, with a whitish border; the other fins are more or less milky on the distal third, except the caudal, which has little dark pigment.

In alcohol, the scale pockets are finely marked, except along the venter. The lateral band starts on the snout, where its width almost equals that of the pupil; it almost disappears on the eye, to reappear behind, extending through the opercular region. On the body it is almost straight, and is about, or slightly more than, half as wide as the pupil. The dorsal and ventral parts are as described in life. The small streaks of the light dorsolateral band are fine, branched, and formed by deep melanophores. The opercle is silvery. The fins, particularly in the creek population, have relatively few melanophores. Melanophores line the dorsal rays, and occur on the lower half of the interradyal membranes, increasing toward the last rays and the point of branching. The anal fin has some pigment along the rays. The first pectoral ray and sometimes the second are also so lined, as are the pelvic rays, but the pectorals are darker near the middle of the length of the rays. The caudal rays, especially the marginals and the 2 to 4 central rays, are also lined.

Etymology.—The name *mandibularis*, derived from *mandibula* (mandible) and the adjectival ending *-aris*, is uniquely applicable to this species; it was suggested by Dr. Carl L. Hubbs.

Ecology.—The water at the type locality at the time of collecting was clear and colorless, and the current was moderate to strong. The sides and bottom were hard, with almost vertical walls, and there was little sand and gravel on the bottom, except in frequent side bays that were shallow and had a deep cover of fine silt. The main channel was so regular, almost straight, 1.2 m wide and 0.9 m deep, as to suggest a rectification of a natural channel. Vegetation was reduced to sparse algae. The water temperature varied from 27° to 29° C. The adults were collected in the main current and the young in the small embayments.

Species associated with *Dionda mandibularis* were a form of *Astyanax mexicanus*, *Dionda* sp. (Hubbs and Miller, 1977), *Cualac tessellatus* Miller, *Ataeniobius toweri* (Meek), *Cichlasoma bartoni* (Bean), and *C. labridens* Pellegrin. If the *Astyanax* proves to be new, all these species would appear to be endemic either to the Laguna de la Media Luna system, or to this system and the Upper Rio Verde.

TABLE 2. Frequency distributions of meristic characters of *Dionda mandibularis* from the Upper Río Verde, San Luis Potosí, México. Values of the holotype are underlined.

		Lateral-line scales												
		37	38	39	<u>40</u>	41	42	43	44	N	\bar{X}			
Creek		..	1	1	7	3	6	..	2	20	41.15			
Springs		1	..	1	1	1	1	1	1	7	40.86			
		Predorsal scales												
		18	<u>19</u>	20	21	22	23	N	\bar{X}					
Creek		2	6	5	4	1	1	19	19.95					
Springs		1	1	2	3	2	..	9	20.44					
		Dorsal rays				Anal rays								
		<u>8</u>	9	N	\bar{X}	7	<u>8</u>	9	10	N	\bar{X}			
Creek		11	9	20	8.45	1	15	3	1	20	8.20			
Springs		11	..	11	8.00	..	11	11	8.00			
		Pectoral rays							Pelvic rays					
		11	12	13	<u>14</u>	15	N	\bar{X}	7	8	<u>9</u>	N	\bar{X}	
Creek		15	21	4	40	13.73	..	15	25	40	8.63	
Springs		1	2	16	3	..	22	12.95	1	20	1	22	8.00	

This interesting fauna has been discussed by Miller (1956) and by Hubbs and Miller (1977).

The body shape and the position and size of the mouth of *Dionda mandibularis* seem to indicate that it is a midwater predator, possibly of recently acquired habits, as the black peritoneum suggests an herbivorous diet, which is common in the genus *Dionda*. Furthermore, the circumstance that the gut is one of the shortest in the genus *Dionda* supports the first interpretation.

Distribution.—*Dionda mandibularis* is known to the writers from three isolated or semi-isolated populations: one, a distributary channel of the Laguna de la Media Luna; two, a marsh and associated spring 2 km S of this marsh; three, the headwaters of the Río Verde at Puerto del Río, near Cerritos, ca 80 km NNW of Rioverde; all in San Luis Potosí (Fig. 3).

Relationships.—In describing *Dionda erimyzonops*, Hubbs and Miller (1974) commented on its inclusion in a group of cyprinid species characteristic of the Pánuco-Tamesí system, now being revised (Hubbs and Miller, 1977). This group is characterized by a short intestine, little circumvolved, that forms a double-S shape that may have an extra twist (Figs. 2 C–E). *Dionda mandibularis*, *D. erimyzonops*, and *Dionda* sp. belong to the first type, and *D. ipni* (sensu Hubbs and Miller, 1974) to the second (Fig. 2F). The forms with the strongly coiled intestines present 3 to 4 twists over the original S shape, as in the extralimital species *D. diabolii* (Fig. 2 G) and *D. episcopa* (Fig. 2 H). As an example, *D. episcopa* follows the approximate sequence shown in Fig. 2 A, C, D, F, H, G. These findings are in agreement with the observations of Kafuku (1958) on the developmental sequence in several Eurasian cyprinids and in catostomids.

Double S-shaped intestines have been described in *Luxilus*, a subgenus of *Notropis*, and in *N. mekistocholas* Snelson (1971), but the type of circumvolution in that species (Fig. 2 B) is not the same. This evidence seems to indicate that such forms and the short-intestined species of *Dionda* do not appear to be closely related. As a phyletic line, the forms of *Dionda* from the Río Pánuco-Tamesí

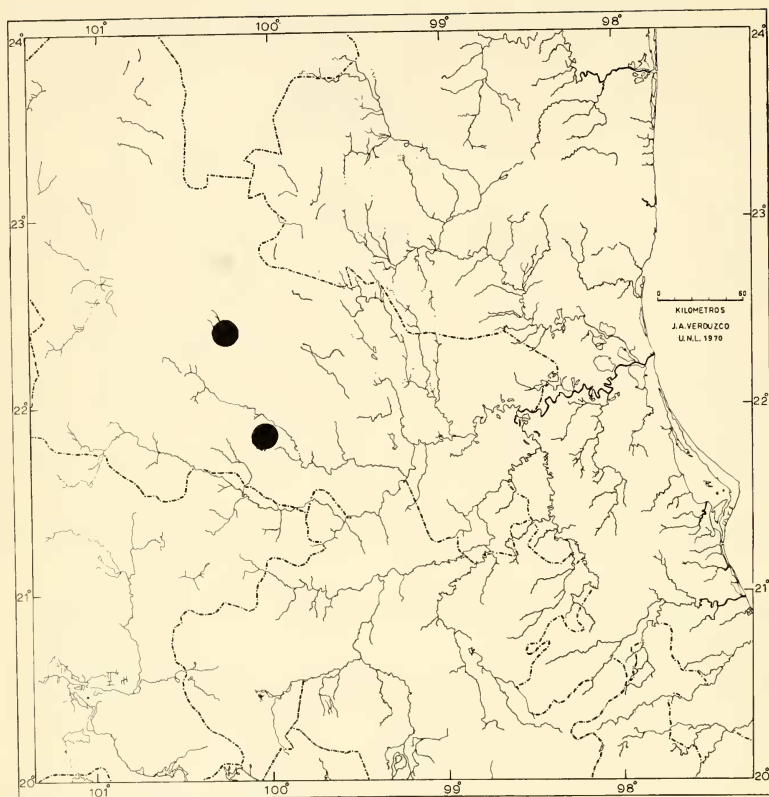


Figure 3. Distribution of *Dionda mandibularis* n. sp.; the upper locality is Puerto del Río, near Cerritos, San Luis Potosí; the lower is the type locality, 7 km SSE of Ríoverde, same state. The third locality, a spring-fed marsh 9.7 km from Ríoverde is not separable on the map.

system seem to comprise a compact and natural grouping, an opinion that we share with Hubbs and Miller (1977). If, perchance, as Hubbs and Miller (1974) suggested, the genus *Dionda* were to be synonymized with *Notropis*, the validity of *Dionda mandibularis* and the other species here mentioned would not be jeopardized. The developmental sequence of these and various other forms is under study and will be described in the near future, in the hope that it will help to understand this interesting complex.

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